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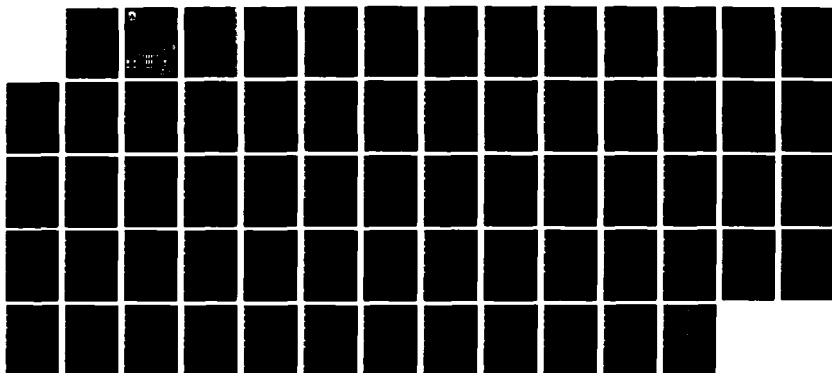
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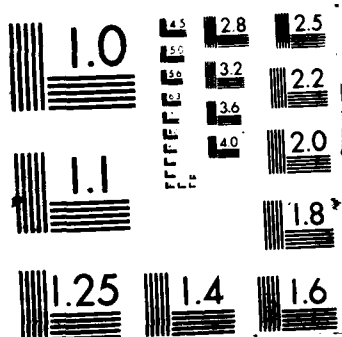
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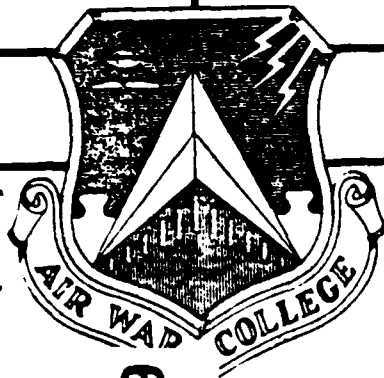
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# AIR WAR COLLEGE

## RESEARCH REPORT

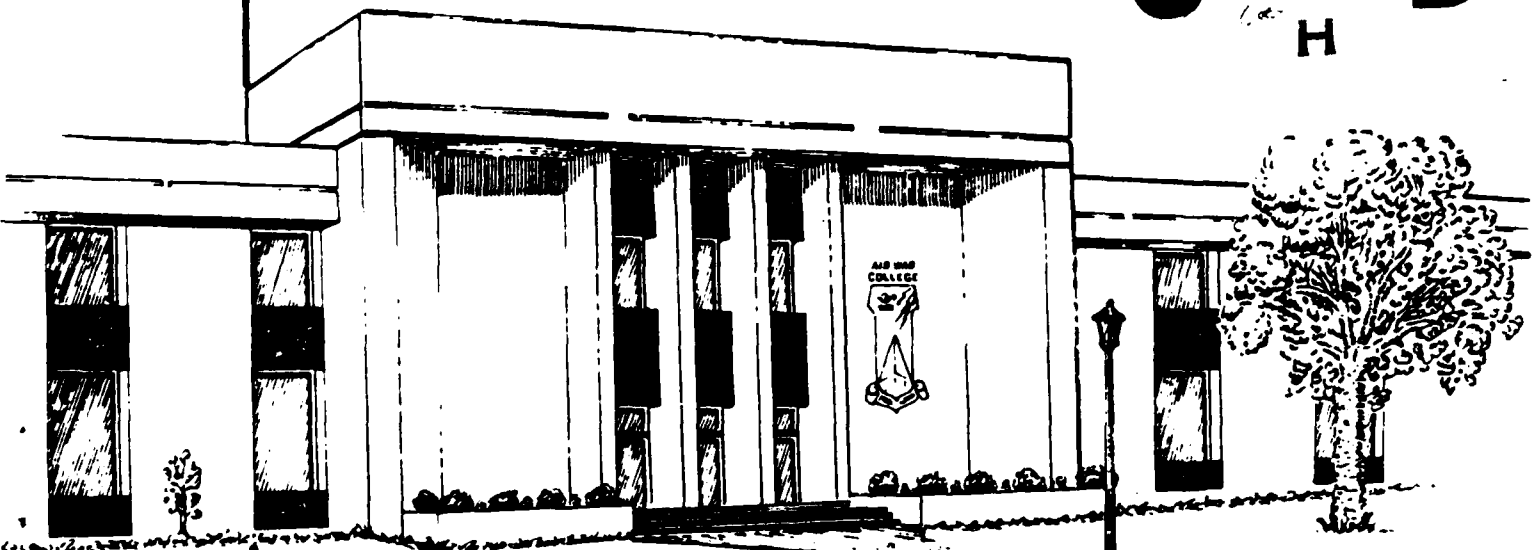
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TACTICAL BASING ISSUES

By LIEUTENANT COLONEL THOMAS E. THURSTON

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TACTICAL BASING ISSUES

by

Thomas E. Thurston  
Lt Colonel, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY  
IN  
FULFILLMENT OF THE RESEARCH  
REQUIREMENT



Thesis Advisor: Col Schroeder  
Technical Advisor: Col Winters

MAXWELL AIR FORCE BASE, ALABAMA

March 1987

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## AIR WAR COLLEGE RESEARCH REPORT ABSTRACT

TITLE: Tactical Basing Issues

AUTHOR: Thomas E. Thurston, Lt Colonel, USAF

The tactical basing structure is seen by the author as being under fire from several sources including urban encroachment, airspace encroachment and environmental concern as well as Congressional pressure to reduce the size of the Air Force base structure to save money. Many of these problems stem from the nature of the fighter mission and the types of training areas required. Moreover, anticipated future changes in the tactical fighter force may exacerbate the situation as faster, more capable aircraft enter the inventory. The author examines each base at which tactical fighter aircraft are stationed in the Continental United States and Alaska, makes assessment of the current situation and specific recommendations for the future. Finally, certain other basing and nonbasing actions are reviewed which may help lessen the problems raised.

## BIOGRAPHICAL SKETCH

Lt Colonel Thomas E. Thurston (B.A., Duke University, M.P.A., Golden Gate University) served for five and one half years as an expert on tactical basing matters on the staff of Tactical Air Command and on the Air Staff. He has surveyed or visited nearly all tactical bases in the continental United States and Alaska and authored the Air Force chapter to the DOD Base Structure Report in 1984 and 1985. He is a recognized authority on environmental issues relating to the basing process, and served on both the Headquarters Tactical Air Command and the Headquarters Air Force Environmental Protection Committees. A senior navigator, he has flown C-141 and F-4 aircraft, serving both as an instructor Weapon Systems Officer and a Standardization/Evaluation Flight Examiner in the latter system. Lt Colonel Thurston is a 1984 graduate of the Air War College Seminar Program.

# TABLE OF CONTENTS

CHAPTER		PAGE
	DISCLAIMER-ABSTAINER . . . . .	ii
	ABSTRACT . . . . .	iii
	BIOGRAPHICAL SKETCH . . . . .	iv
I	INTRODUCTION . . . . .	1
II	THE NATURE OF THE PROBLEM . . . . .	3
III	FUTURE CONSIDERATIONS . . . . .	8
IV	WHAT IS BEING DONE . . . . .	10
V	EVALUATION OF CURRENT TACTICAL BASES . . . . .	12
	Bergstrom . . . . .	12
	Cannon . . . . .	14
	Davis-Monthan . . . . .	14
	Eglin . . . . .	17
	Eielson . . . . .	18
	Elmendorf . . . . .	20
	England . . . . .	21
	George . . . . .	22
	Hill . . . . .	23
	Holloman . . . . .	25
	Homestead . . . . .	26
	Langley . . . . .	27
	Luke . . . . .	28
	MacDill . . . . .	30
	Moody . . . . .	32
	Mountain Home . . . . .	33
	Myrtle Beach . . . . .	34
	Nellis . . . . .	35
	Seymour Johnson . . . . .	36
	Shaw . . . . .	38
	Tyndall . . . . .	39
	Williams . . . . .	41
VI	POSSIBLE NON BASING SOLUTIONS . . . . .	43
	Simulators . . . . .	43
	Inflight Refueling . . . . .	46
	Unit and Aircraft Deployments . . . . .	47
	The USAF Priority System . . . . .	49
	Land Exchanges . . . . .	50
VII	REALIGNMENTS AND BASE CLOSURES . . . . .	53
VIII	SUMMARY AND CONCLUSIONS . . . . .	56
	LIST OF REFERENCES . . . . .	58

## CHAPTER I

### INTRODUCTION

This paper will examine the current stateside basing structure of our active duty tactical fighter force. Such an examination is long overdue. There are currently 21 bases in the continental United States (CONUS) and Alaska which host one or more active duty wings of tactical fighter or attack aircraft. Most of these bases are assigned to Tactical Air Command or to Alaskan Air Command. A few are assigned to non tactical commands and, in these cases, the tactical fighters are tenant units on the base. For purposes of this paper, all bases with tactical fighter aircraft assigned will be considered to be part of the tactical basing structure.

Unfortunately, not all tactical bases provide the same availability to training areas, the same weather conditions or the same environmental considerations. As the fighter force grows toward its stated 26 active duty wing goal, and as fighter aircraft characteristics change, it will become increasingly important to match weapon systems with bases which can best support their training needs. It will also become increasingly important to recognize those bases with potential environmental problems (especially urban encroachment) and to minimize the impact of basing decisions at those installations. Finally, as the force grows, it will be necessary to know where expansion potential exists.

There is one other issue which is critical to tactical

fighter basing. That is the availability of adequate training areas. Air-to-surface ranges are few in number and most are seriously restricted in size and ordnance delivery options. Supersonic airspace is limited and facing increasing environmental challenge to its very existence. The military services have been only marginally successful in recent efforts to expand existing training areas or create new areas. The continued availability and viability of these areas is critical to training and, thus, to basing.

It is my intent in this paper, to examine the nature of the tactical mission and the ways in which tactical basing requirements are unique, to broadly review existing tactical base structure, and to look both at current and potential future basing problems. Next, I will take a detailed look at the current tactical basing structure, making base by base evaluations. I will then evaluate some frequently offered solutions to basing problems (expanded use of simulators for example). And, finally, I will make some important points on base realignments and closures. In the course of the paper, I will make extensive use of my personal experience in the field of tactical basing.

## CHAPTER II

### THE NATURE OF THE PROBLEM

Tactical fighter aircraft stationed in the United States (as compared to those forward based) serve three very important purposes. First, they provide initial aircrew training to newly assigned personnel. Second, they provide a ready source of planes and aircrews to respond to world wide contingency tasking. Finally, they provide a rotation base for forces assigned overseas. Stateside aircrews must maintain a constant, high state of readiness. This can only be accomplished through a rigorous, realistic training program.

The average tactical fighter base in the CONUS has over 110 aircraft assigned. (27) A few bases are assigned as many as 200 fighter aircraft. Since fighter aircraft are flown at rates approaching one sortie per aircraft per day, the average tactical fighter base flies about 110 aircraft sorties per day to accomplish required training. A tactical fighter sortie may last from 45 minutes to three and a half hours depending on aircraft type and mission profile and typically consists of a take off, transit to a training area, performance of specific air-to-air or air-to-surface training events, return to base, one or more practice approaches to the runway and a final landing. Most tactical training is done in flights of two or more aircraft.

Because fighter aircraft are relatively small, they carry only limited amounts of fuel. Thus, the most serious limiting factor to tactical training is the distance which fighter aircraft are able to fly to reach suitable training areas. With the exception of the F-111, a modern fighter can travel no further than 200 miles to a training area if it is to retain sufficient fuel to accomplish effective training and return to home base. (25) In the case of bases where bad weather frequently requires aircraft to return with sufficient fuel to divert to an alternate field, that maximum radius may be even smaller. The F-111 may travel beyond 200 miles to reach a training area, but with only two F-111 wings in the CONUS, this is a rather academic distinction.

Tactical fighter aircraft require four basic types of training areas: medium and high altitude supersonic maneuvering airspace; low, medium and high altitude subsonic maneuvering airspace; low level navigation routes and air-to-surface gunnery ranges. Not every fighter requires equal access to each type of airspace. Airspace requirements are driven by mission and by aircraft performance capabilities. The A-10, for example, has an air-to-surface mission and requires access primarily to gunnery ranges, low level training routes, and low altitude maneuvering airspace. Since the A-10 cannot fly at supersonic airspeeds, it has no requirement for supersonic training areas. In making basing decisions, it is important to think ahead, considering the entire projected force structure and not just the specific

system under consideration. Two bases may be equally suitable for A-10 aircraft, for example, but one may have excellent access to supersonic airspace which would make it a stronger candidate for a supersonic fighter such as the F-15 or the advanced tactical fighter (ATF) at some future point.

The second factor which must be considered in fighter basing is environmental concerns. Many fighters use afterburner to assist takeoffs and during heavy in flight maneuvering. Afterburner operation is considerably more noisy. Further, the average fighter base, with more aircraft and a higher rate of aircraft utilization, will have more aircraft flying activity than a strategic bomber or an airlift base. This also tends to create more noise. Supersonic flight, gunnery ranges and low level routes which go with fighter operations are also environmentally contentious. Most of our bases were built during World War II or shortly thereafter. They were sited well away from then existing urban centers. But many urban areas have grown dramatically (Phoenix for example -- 4:1) and are now on the very door steps of our bases. In these cases especially, care must be taken to minimize the impact of flight operations on our civilian neighbors.

A third factor influencing fighter operation (and thus basing) is weather. Fighters require visual meteorological conditions to train effectively. They usually lack the fuel reserves to reach more distant training areas and, as previously noted, poor weather at home station may require

that aircraft return with sufficient fuel to fly to an alternate field should ceilings and visibility go below allowable landing minimums.

A final factor to be considered is potential conflict with other missions at a given base or with missions at nearby bases which share available training areas. Test and evaluation missions, for example, are awarded a higher priority than fighter training. It is not uncommon for a range complex which supports test and evaluation to be lost to fighter training for hours, even days at a time when test series are being conducted. Similarly, when two or more bases compete for a given training area, training at one or both may suffer if there is insufficient time available to satisfy the requirements of all users.

The combination of these factors has created a fighter basing structure (16:163) which is concentrated in the desert Southwest and along the Gulf and lower Atlantic Coasts. This area, commonly known as the sun belt, has been enjoying phenomenal civilian growth rates in recent years, creating urban encroachment at many tactical bases and making the creation of new training areas extremely difficult. The author has actively participated in the Air Force efforts to build a major air-to-surface gunnery range on the East Coast which has run into very heavy civilian opposition from the outset.

Technology has added to the problems of basing the force. Improved offensive capabilities require greater use

of supersonic airspace if aircrews are to train as they will fight. Moreover, larger ranges are required to practice delivery of standoff ordnance. The sophistication of the threat, similarly, requires greater emphasis on defensive reaction to include low altitude maneuvering, variations of attack headings on ranges, and more night training.

Also adding to the problem has been an increase in civilian access to wilderness areas brought about by all terrain vehicles. Areas which were once overflown without incident past now generate noise complaints.

### CHAPTER III

#### FUTURE CONSIDERATIONS

The next war may well be "come as you are"-- that is to say, we may not have the luxury of lengthy warning times to allow our aircrews reach necessary performance levels. It is increasingly imperative, therefore, that aircrews be permitted to train realistically.

John Correll, Executive Editor of Air Force Magazine, suggests that "with the advent of all-seeing sensors and ever smarter weapons... tactical airpower appears to be on the threshold of a new era." (12:52) That new era will put added strain on existing training areas and concepts of force basing. Low level navigation at 1000 or even 500 feet above the ground will no longer be realistic. Combat oriented low level training will mean 100 feet or less. Basing decisions on systems which feature such capability must consider the availability of large, uninhabited areas which are clearly suitable for very low altitude, high airspeed training. Supersonic cruise capability projected for the advanced tactical fighter will tax existing supersonic airspace, necessitating over water training and making coastal bases most suitable to host that system.

Similarly, only a relatively few air-to-surface gunnery ranges can handle firing of standoff weapons such as the GBU-15 or the unrestricted use of radar and communications jamming equipment such as is carried by the

EF-111 and the EC-130 Compass Call. (13) These ranges will be further taxed by the requirement to test and evaluate increasingly sophisticated family of pilotless vehicles such as the cruise missile and other remotely piloted vehicles. Unfortunately, most ranges in this latter category (the Utah Test and Training Range, the White Sands Missile Range and the Eglin Range, to name three) are now heavily burdened with aircrew training as well as test and evaluation requirements. As test and evaluation operations increase, these areas will be even less available for aircrew training.

## CHAPTER IV

### WHAT IS BEING DONE

The tactical world is not unaware of the noise problem, nor is the Air Force. Tactical Air Command has established quiet hours command wide. Under this directive, aircraft operations are prohibited during specific nighttime hours (currently 10:30 PM to 6:00 AM at Luke AFB [4:38] for example). Engine maintenance runs and other noise producing operations are also curtailed during this period. The sole exceptions are inflight emergencies and a strictly limited amount of night flying. The latter is announced to local citizenry well in advance.

The second ongoing program to alleviate the problem is the Air Force's Air Installation Compatible Use Zone (AICUZ) studies. The AICUZ study is performed by each base and must be updated with any significant change in flying activity or aircraft equipage. Essentially, the AICUZ provides planning guidelines to be used by the local community in making zoning decisions and establishing building codes in the vicinity of Air Force bases. The AICUZ uses procedures established by the Environmental Protection Agency to measure average noise levels and projects a series of noise level contours which radiate out from normal aircraft flight paths (ref 2-9). Specific recommendations are made as to the most compatible use of land falling within each contour. Some land may be suitable for industrial but not residential use, for example.

The AICUZ also identifies specific clear zones and Accident Potential Zones at the end of each runway which should be kept clear of all inhabited structures.

Nothing in the AICUZ is binding on the community. It is advisory only. But, when the guidelines are followed, the resulting base/community relations are generally much improved. In a 1979 report, the General Accounting Office said of the Air Force AICUZ program:

The bases' efforts in cooperating with communities, reporting on the need for compatible land use, and making operational changes have, in most cases, been successful in lessening the impact of flight activities on base environs and in furthering community and base land use needs (15:i-ii)

## CHAPTER V

### EVALUATION OF CURRENT TACTICAL BASES

This chapter will include a specific evaluation of each tactical air base, addressing current status, special capabilities, potential problem areas and, where applicable, making recommendations. Because tactical basing cannot realistically be separated from training areas, several of the Air Force's major air-to-surface ranges and supersonic training areas will also be assessed. Bases will be covered alphabetically. Information on base location and current mission was obtained from the May 1986 edition of the Air Force Magazine and will not be separately referenced.

Bergstrom AFB, TX: Bergstrom AFB is located on the southeast edge of Austin Texas. It is a multi-mission base, hosting an active duty numbered air force headquarters, the only CONUS based active duty reconnaissance wing, an Air Force Reserve (AFR) numbered air force headquarters and an AFR fighter squadron. The reconnaissance mission has fewer specific training area requirements than any other mission in the Air Force: low level training routes are needed and subsonic maneuvering airspace is required to practice defensive maneuvering. Since Bergstrom has limited access to gunnery ranges and no nearby supersonic airspace, this is an ideal matching of mission to base.

The municipal airport in Austin is Robert Mueller Field. Robert Mueller is located five miles northwest of

Bergstrom and has a single runway oriented at approximate right angles to Bergstrom's single runway. This situation produces a potential point of air traffic conflict (called Snafu Intersection in the Air Force Flight Information Publications) where the two runway centerline extensions converge. Further, Robert Mueller is located in downtown Austin. This situation is less than satisfactory to the city and the author has been involved in negotiations between Austin and the Air Force on two occasions concerning possible joint use of Bergstrom. Although the Air Force discouraged these approaches, the issue may not be dead. The Bergstrom public affairs office advised the author that a recent nonbinding referendum on the possibility of building a new municipal airport failed to pass a city wide vote.

The current Air Force reconnaissance platform is the RF-4C, first built in the early 1960's. Although no dedicated replacement platform is now programed to replace the RF-4C, several options are being reviewed, including Remotely Piloted Vehicles (RPV). If no replacement is forthcoming, a new mission must be found for Bergstrom. The base once hosted a tactical air control mission and would be suited for a follow on Air Force tactical/forward air control aircraft. It might also be suitable for RPV basing if that mission becomes a reality. Either mission could likely be accomplished with minimum of gunnery range requirements and neither would require supersonic airspace. It follows that Bergstrom would be a poor choice for follow on air-to-air or

air-to-surface fighter aircraft.

Cannon AFB, NM: Cannon AFB is located several miles west of Clovis New Mexico and currently hosts a wing of F-111 fighter aircraft. It may not be widely known that Cannon was a finalist for M-X basing consideration, attesting to the base's expansion capability. Cannon is relatively free from urban encroachment and environmental controversy, although recent proposals to increase the size of Melrose air-to-surface gunnery range just west of the base created some opposition during local hearings in June 1984. (19:61-62)

Located in a sparsely populated, desert area and with nearby low level flying areas and a gunnery range virtually next door, Cannon is an ideal tactical base. Current base facilities are limited and flightline space is at a premium due to the configuration of the cross runways, but with careful planning and some financial investment Cannon could host a second wing. This finding was born out essentially by the 1982 M-X survey in which the author participated. While Cannon does lack access to supersonic airspace, it could still support any air-to-surface fighter.

Davis-Monthan AFB, AZ: Davis-Monthan AFB is located on the southern edge of Tucson, Arizona. A multiple mission base, D-M hosts a tactical air division, an A-10 wing, a tactical air control wing with a squadron of OA-37 tactical air control aircraft, the crew training unit for the Ground Launched Cruise Missile (GLCM), an Electronic Combat (EC-130 Compass Call) Squadron, two Air Guard aircraft on air defense

alert unit, a US Customs Service air interdiction unit, and the Air Force Military Aerospace Maintenance and Regeneration Center (AMARC or the "bone yard"). Further, D-M serves as a primary site for Air Guard and Reserve "Snow Bird" aerial gunnery deployments.

Once situated well south of Tucson, D-M is rapidly being surrounded by urban growth. City planners and builders have not always respected the Air Force recommended clear zones or noise pattern contours and a 1975 study suggested that encroachment was reaching the critical stage (2:ii-3).

Complicating matters, there is a major civilian airport immediately southwest of the base which hosts both civil aviation and an Air Guard A-7 training unit. Moreover, the approach path to D-M's single runway leads directly over the city and the campus of the University of Arizona. That approach is parallel to and slightly east of the approach to the civilian field.

Further, the relationship between D-M and the city of Tucson has not been without some strain. Four civilian deaths resulted from the crash of an F-4 into a supermarket in 1967 (17:4) while two University of Arizona coeds were killed in 1978 when an A-7 crashed on a downtown street, impacting less than 100 feet from a school (18:38). These accidents have focused community and Congressional interest on reducing overflight of populated areas. (18:39&40) Moreover, when the GLCM mission was first introduced, there were demonstrations including several incidents in which

civilian demonstrators breached the base boundaries. When the author visited D-M in October, 1985 these problems had been largely smoothed over thanks to an excellent public relations effort. Construction of an auxiliary air field for instrument approach training at Fort Huachuca, south of Tucson, has also helped. Nevertheless, the Tucson papers seldom fail to note the anniversaries of the jet crashes.

There is a second problem faced by D-M and implicit in the large number of missions which the base supports. D-M is being virtually overrun by its tenants. Incredibly, Congressional pressure has led to further additions: the pending establishment of an Air Force Reserve special operations helicopter squadron at D-M and the doubling of the size of the US Customs Service Air Wing.

Although beset by problems of encroachment, D-M remains an extremely important element of both the tactical and Air Force basing structure. First, it is one of only two bases with unrefueled access to the air-to-surface gunnery range complex at Gila Bend. (22) Second, its location offers to Air Force personnel and their families excellent quality of life standards. Third, the 2300 acre AMARC facility is one of a kind. Due to its size, as well as its climate and mission support requirements, it could not be easily duplicated. In short, the base must be preserved. In assigning future missions to D-M, the three above points must be clearly remembered and understood.

The question of future basing is critical, then. With

civilian sensitivity to overflight and with the orientation of the runway, the introduction of high performance jet fighters would probably meet with significant opposition. There is not sufficient land available to reorient the runway and, in fact, reorientation of the Air Force runway would force reorientation of the civil runway as well. The proximity of the Gila Bend range argues for an aircraft with an air-to-surface mission at D-M. Availability of an auxiliary field makes the base ideal for a training mission, as does the predominance of good weather. D-M might be a good choice, therefore as the training base for the next generation Air Force attack aircraft (the successor to the A-10) or, alternately, for a follow on tactical air control aircraft. Meanwhile, efforts to squeeze in even more tenant units should be resisted.

Eglin AFB, FL: Eglin AFB is an Air Force Systems Command (AFSC) base located northeast of Fort Walton Beach, Florida. The base boundaries include one of the largest air-to-surface test range complexes in the Air Force (the Eglin Range). Eglin is also controlling agency for the Southeast Test and Training Area (SETTA), an 86,500 sq mi over water test area. (24:51) Although Eglin hosts a tactical F-15 wing, it is primarily a Test & Evaluation installation and is operated by AFSC's Armament Division.

Eglin is surrounded by its own range so encroachment has not been a serious problem. While working a minor rebasing move, however, the author discovered that the

environmental concerns of the civilian community, especially over issues of noise and ground water pollution, are real and must be carefully considered. Further, the range is home to the endangered Red-cockaded Woodpecker. Base environmental engineers have plotted all their known nesting areas and live ordnance testing is planned around this habitat.

The biggest problem for tactical operations at Eglin is the AFSC Test & Evaluation mission. As previously noted, test missions take priority over tactical training and availability of the SETTA for over water supersonic training is limited. A new supersonic area to the south of the SETTA has recently been approved by the FAA. That area must be approached circuitously, however, when the SETTA is in use and is, thus, at the outside limits of acceptable distance. Although the F-15 is primarily an air superiority fighter and does not require air-to-surface ranges, accessibility to the Eglin air-to-surface test range is also limited.

The SETTA is a valuable asset for both test and training and must continue to be available for both missions. Its availability, though limited, is adequate for the current tactical aircraft requirements placed on it. Eglin should, thus, retain its tactical tenant and has excellent potential as a host base for the Advanced Tactical Fighter.

Eielson AFB, AK: Eielson AFB is an Alaskan Air Command base, located southeast of Fairbanks Alaska. It hosts a single squadron wing of A-10 aircraft, a permanent

detachment of aerial refueling tankers and an RC-135 special reconnaissance unit. A recent Congressional initiative will also bed down a small unit of Reserve Force tankers there.

Eielson is well away from population centers. It has easy access to gunnery range facilities at nearby Fort Wainwright and it possesses adequate land for expansion. During an April 1985 visit, the author was briefed on two basing problems. The first is the effect of the extreme cold on personnel and equipment. The second is the inflated cost of construction in Alaska which can run over twice that in the lower 48 states. The cold weather forces operations which might normally be performed out of doors, flightline maintenance on the aircraft for example, to be performed indoors and that all buildings be efficiently heated and insulated. For example, most fighter aircraft currently stationed at Eielson are housed in enclosed and heated shelters. These same aircraft at a southern tier base would be parked in the open, on a concrete parking apron. The combination of more construction required and inflated building cost adds considerably to the total cost of beddown.

Despite, or perhaps because of these basing costs, Eielson is underused. It has the tactical advantage of having air-to-surface training areas nearby (aircraft from the lower 48 states have actually deployed to Eielson in the summer to use the range). It has a positional advantage as well. Eielson is actually closer to potential areas of conflict in the Pacific theaters than any base in the lower

48 and is closer to the European theater than bases west of the Mississippi. Thus, aircraft from Eielson could conceivably deploy more quickly worldwide.

Eielson has few encroachment or environmental problems and, thus, should be considered for follow on ground attack fighter aircraft and for eventual expansion as the fighter force grows to 40 wings and beyond.

Elmendorf AFB, AK: Elmendorf AFB is located on the northern edge of Anchorage, Alaska. It is also an Alaskan Air Command (AAC) base and hosts a two squadron wing of F-15 aircraft as well as AAC headquarters, a NORAD regional operations center, a C-130 tactical airlift squadron, and an Aerospace Rescue and Recovery unit.

Anchorage is situated in a pocket of land, bounded by water on two sides, by mountains on a third and by the government reservations of Elmendorf and Fort Richardson on the fourth. It is almost inevitable, therefore, that both installations will face some encroachment. As the population of Anchorage grows, this situation will likely worsen. The author was briefed on a state proposal to construct a causeway across the Knik Arm of the Cook Inlet, linking Anchorage to the Kenai Peninsula to the west. This project would require access across Elmendorf and could adversely impact certain intelligence gathering sites on the base.

Surprisingly, Elmendorf does not experience the bitter cold of Eielson. Nor is construction quite as high, although still higher than lower 48 costs. Further, Elmendorf

possesses some excellent flightline facilities which are currently underused. In short, the base could easily host a third squadron of fighter aircraft. Excellent access to over water training areas and marginally acceptable distances to the Fort Wainwright range suggest that Elmendorf continue to host an air-to-air mission.

It must be noted that Elmendorf aircraft have both a peacetime alert mission (home station and at two remote sites) in support of NORAD and a wartime mission in defense both of Alaska and the lower 48 states. Placing more aircraft in Alaska must, therefore, be an operational planning and not a pure basing decision.

England AFB, LA: England AFB is located west of Alexandria, Louisiana. It is a single mission base hosting three squadrons of A-10 fighter aircraft. England is without serious environmental or urban encroachment problems at this time, nor are there indications of future problems. The base has no supersonic airspace nearby and would be unsuited to air-to-air fighters. There are two air-to-surface ranges within 50 miles of the base (22) although both are somewhat size limited and lack some requisite delivery options. (13)

England is well suited to its current mission, then, but has limited future basing options. Still we would be ill advised to ignore it or to lose it from the base structure. The most promising future missions include tactical air control and ground attack, although some range improvement would be desirable for the latter.

George AFB, CA: George AFB is located near the cities of Victorville and Adelanto California. Their city limits bound the base to the west, south and east. George hosts a tactical air division, comprising a wing of F-4G Wild Weasel aircraft, a wing of F-4 fighter aircraft, and a squadron of OV-10 tactical air support aircraft. The base frequently hosts active and reserve force aircraft supporting Army operations at the National Training Center (NTC) at Fort Irwin. (1:4) George and Nellis are the only tactical bases close enough to the NTC to provide such support without aerial refueling.

Besides the NTC, George has access to two excellent air-to-surface ranges, one at Superior Valley and the other at Leach Lake. George is also close enough to Nellis AFB to use the Nellis ranges (22), although lack of available range time generally precludes this option. George also has access to the Marine Corps supersonic training area at Twenty Nine Palms and to the Edwards Air Force Test Range, both on a limited basis.

In all, George would seem ideally suited as a tactical base. There are some problems however. The city of Los Angeles, which lies to the southwest and across the San Gabriel Mountains, has long eyed the high desert as a possible location for a new international airport. One of the potential sites is at Palmdale. Use of that site would put George directly under the final approach path and could seriously curtail tactical operations and affect access to

training areas. There is also encroachment, particularly from the city of Adelanto. (3:II-2)

Barring construction of an international airport, George should remain an extremely viable part of the tactical base structure for many years. Its proximity to air-to-surface ranges strongly suggest that it retain an air-to-surface mission fighter. However, when bedding down new aircraft at George, care should be taken to leave room for deployed aircraft, whether reserve force "snow birds" or planes supporting the NTC. Like the Nellis ranges, the opportunity to train with the Army on the NTC is wasted if it is not available to relatively large numbers of aircrews.

Hill AFB, UT: Hill AFB is located southwest of Ogden, Utah on the eastern shore of the Great Salt Lake. An Air Force Logistics Command (AFLC) base, Hill hosts a major aircraft and missile logistics facility, the Ogden Air Logistics Center, as well as an active duty air-to-ground fighter wing and an Air Force Reserve fighter squadron. Units at Hill are also responsible for maintaining and scheduling the Utah Test and Training Range (UTTR). This range facility contains both air-to-surface range complexes and supersonic airspace. It is located on the west side of the Great Salt Lake and east of the Bonneville Salt Flats.

Hill has hosted fighter aircraft only since the drawdown of the Vietnam War. When the decision was made, it must have appeared to be a perfect match of mission to base. Unfortunately, there have been a number of problems with

fighter aircraft at Hill. The first is weather. Hill is located in the area between the Wasatch Mountains and the Great Salt Lake. The prevailing winds, more pronounced in the winter, pick moisture up from the lake and back it up against the mountains, where it becomes fog or precipitation. This problem became so significant that TAC recently removed one active duty squadron from the base due to the wing's inability to achieve required training in the winter. This weather problem affects the range areas, which are to the west of the lake, also, but to a lesser degree.

The second problem has been more recent in nature -- attempted encroachment on the range. The author was directly involved with two recent proposals from the State of Utah which attempted to use land area currently a part of the UTTR. The first was a proposal to sight a giant atomic particle accelerator (to be the world's largest) on a portion of the range. The second sought to control flooding of the lake by creating vast evaporating pools on the range. The author found that the first proposal, by far the most far reaching in effect, would create an unacceptable level of urban and electronic encroachment. The second might well degrade range weather. Either could sound the death knell for the base as part of the tactical base structure.

The UTTR is a truly unique test and training asset. Nevertheless, weather at Hill will likely preclude basing more than a single wing of fighters there. All weather delivery capability will probably increase, however, as

fighter aircraft become more sophisticated and consideration should be given to basing an all weather aircraft at Hill in the future to continue to take maximum advantage of the capabilities of the base and the UTTR.

Holloman AFB, NM: Holloman AFB is located eight miles west of Alamogordo, New Mexico on the edge of the Army's White Sands Missile Range. Also a multiple mission base, Holloman hosts a tactical air division, an air-to-air fighter wing, a tactical training wing which provides fighter lead in training for all newly assigned tactical aircrews, and twenty one tenant units including the Air Force's rocket sled track.

Located approximately half way between El Paso and Albuquerque, Holloman has experienced minimal civilian encroachment and would seem to have all the air-to-air and air-to-surface training areas, existing and potential, that the base's units actually need. Until the late 1970's, this was largely true. Army usage of their White Sands Missile Range has increased markedly in recent years, however, and a multi-year effort to gain new supersonic training areas was so strongly opposed by ranchers and elected officials that the emerging training areas were of marginal value due to the restrictions imposed.

This creates an ironic situation. Located in the middle of a large air-to-surface and air-to-air test area, Holloman finds itself without enough of either to really satisfy a wholly air-to-air or air-to-ground mission. A dual role fighter might be an excellent compromise, therefore,

since both types of training areas would be required but, seemingly, neither would be required in the same degree as with a single mission aircraft.

Homestead AFB, FL: Homestead is located five miles northeast of the city of Homestead, Florida and about 20 miles south of Miami. The base hosts an active duty fighter wing, an Air Force Reserve fighter squadron, an Air Force Reserve rescue and recovery squadron, an Air Guard interceptor detachment, and the Air Force Conference Center. Additionally, Homestead is home base for a US Customs Service air interceptor unit.

Despite its proximity to the Miami metropolitan area, Homestead has experienced relatively little urban encroachment. The base is near both the Atlantic Ocean and the Gulf of Mexico and possesses excellent over water supersonic training areas. It is also within 150 miles of the Avon Park air-to-surface range complex. (22) Homestead's parking apron is large, although some segments are in poor repair, and there is potentially room for some expansion.

There are also a few problem areas. The first is weather. Southern Florida is known for its summertime thunderstorm activity. Homestead is a single runway base and the only suitable alternate nearby is Miami International. This makes predicting the weather a touchy procedure. During a November 1985 visit, the author was briefed that during certain months of the year, a daily line of thunder storms tends to develop on a southwest to northeast axis and

extending completely across the state, centered roughly on Lake Okeechobee. These storms block direct access to the Avon Park ranges, adding distance to the trip and raising the fuel requirements. A second problem is the persistent perception that Miami is not a wholesome atmosphere to raise a family.

Homestead has recently converted to the F-16 fighter with a primarily air-to-ground role and is likely to be in that aircraft for some time. Some in the tactical community viewed that conversion as a mission mismatch and would have preferred to have seen an air-to-air fighter at Homestead to take advantage of Supersonic airspace. It may indeed prove prudent in the future to use Homestead for the air-to-air mission, even at the expense of moving the F-16 aircraft elsewhere.

Langley AFB, VA: Langley AFB is located just north of Hampton, Virginia. Langley shares a runway with the NASA Langley research facility located on the north side of the field. The base hosts a number of missions and functions. First, it is home to Tactical Air Command's headquarters and to headquarters, First Air Force. Additionally, several flying missions are located there to include an air-to-air fighter wing, a fighter interceptor squadron, an airborne command and control squadron which supports CINCLANT, an administrative airlift detachment and an Army aviation unit which supports the nearby US Army Training and Doctrine Command (TRADOC). Langley is also host to the Air Force

Center for Low Intensity Conflict.

Langley is located at the tip of a peninsula of land formed by the southwest and northwest branches of the Back River. It is further protected on the north by the NASA area, leaving the base vulnerable to encroachment only from the west. This siting also has the effect of limiting expansion options. The base is close to the Atlantic Ocean and the Chesapeake Bay and has access to overwater Supersonic training areas, which it shares with US Navy fighters operating out of Norfolk and Oceana Naval Air Station.

Although weather is obviously not as good as at desert bases, Langley has no serious problems except its inability to support growth. It is adequately suited to its air-to-air mission and is a good candidate for the Advanced Tactical Fighter. It is also invaluable for its proximity to support Navy and Army aviation requirements and its nearness to TRADOC which allows a steady dialogue in the development of joint doctrine and tactics.

Luke AFB, AZ: Luke AFB is located ten miles west of metropolitan Phoenix, Arizona in an area bounded by the cities of Glendale to the east, Youngtown and Sun City to the northeast, Surprise and El Mirage to the north, and Avondale, Goodyear, and Litchfield Park to the south. Between 1960 and 1980, the cities surrounding the base grew from just under 500,000 residents to almost 900,000. That figure is projected to reach 1.4 million by the year 2000. (4:33)

Encroachment, then, is a major problem. In the base's

Air Installation Compatible Use Zone report, published in 1985, encroachment is cited as "reaching a critical stage as incompatible developments are being proposed in the accident potential zones and high noise areas." (4:viii) Truly, the relationships between the base and its surrounding communities tends to be love/hate. On the one hand, Luke generates nearly \$250 million in the local economies. It employs over 1000 civilians and its commissary and exchange facilities are used by over 18,000 military retirees in the area. (4:10) On the other hand, land around the base has been valued as high as \$20,000 per acre. (4:28) Many of the incorporated areas surrounding the base are land limited, effectively locked in by their neighbors. The decision to limit development of limited land resources to protect the base has serious economic consequences.

From the Air Force point of view, Luke is no less precious. The base sees nearly 365 days of good flying weather per year. It is host to a tactical air division and to two fighter training wings, one air-to-air and one air-to-surface. It also hosts an Air Force Reserve unit which is transitioning to fighter aircraft. Most importantly, it controls the Luke Air Force Range, a 2.7 million acre air-to-surface training area. Luke and Davis-Monthan are the only bases with unrefueled access to this facility, as well as to the Sells low altitude training area and to associated supersonic air-to-air training areas. Loss of access to these areas would be tragic.

The problem, then, is to balance Air Force and national defense needs with the needs of the civilian community. Currently, the State of Arizona, the base and the surrounding communities have reached an uneasy truce, and encroachment has been at least slowed. For its part, the base has made changes to arrival and departure patterns, instituted strict quiet hours, and agreed to do as much traffic pattern training as possible at auxiliary airfields. (4:37-8) In the long term this may not be enough. Rising property values and populations may soon force the Air Force to seek imaginative, even radical solutions which will retain access to irreplaceable training areas while satisfying civil pressures. We must be careful of the signal we send in implementing any such solutions, however, since the encroachment problem at Luke is unique only in its severity.

Assuming such solutions can be found, Luke will remain capable of hosting either air-to-air or air-to-ground fighters. The proximity of the Luke range and its relative freedom from encroachment or controversy argues more strongly for air-to-ground, however. Luke could remain an F-16 training base well into the future and could support the training mission in a follow on air-to-ground fighter as well.

MacDill AFB, FL: MacDill AFB is located south of Tampa, Florida, on a peninsula extending into Tampa Bay. The base hosts multiple missions, to include a tactical fighter training wing, and the headquarters for both US Central

Command and US Readiness Command.

As with Langley, MacDill's physical position serves both to limit expansion and to protect the base to some extent from urban encroachment. Unlike Langley, however, MacDill is located seven miles directly south of the busy Tampa International Airport. It is also close to several general aviation airports. Base housing is limited, moreover, and suitable off base housing areas tend to be many miles distant in St Petersburg and on Tampa's east side. The base is on environmentally sensitive wetlands and must be very careful in any proposed development.

Located near the Gulf of Mexico, MacDill enjoys access to overwater supersonic airspace as well as to the air-to-surface gunnery range at Avon Park, 70 miles east. (22) It currently hosts nearly 100 fighter aircraft and could handle more from a pure training area standpoint if facility and personnel expansion were more feasible.

All in all, MacDill seems to face no immediate problems beyond airspace saturation in the immediate vicinity of the base. With access to both over water supersonic areas and air-to-surface ranges, the base could support virtually any fighter mission. In making a choice somewhere in the future, planners must consider use of the Avon Park Range. Only two bases, MacDill and Homestead, have unrefueled access to that range. Both bases also have access to overwater supersonic areas. Unless the requirement for the latter greatly exceeds availability elsewhere, one of the two bases

should be retained in an air-to-ground mission. Since MacDill's access to the range is best, it is the most logical candidate for air-to-ground mission retention.

Moody AFB, GA: Moody AFB is located nine miles northeast of Valdosta, in south central Georgia. Formerly an Air Training Command base, Moody now hosts a single wing of air-to-ground fighter aircraft. In addition to the runway, parking apron and support structures of the normal base, Moody is constructing an air-to-surface gunnery range on property adjacent to the base. This will make Moody one of only two stateside fighter bases with a contiguous range.

Moody has little current problem with encroachment. (5:iv) Creation of the range was not universally accepted, however, and will broaden noise contours and increase the amount of land effected by them. As to the range itself, it will be relatively small and will have little inherent capability for tactical deliveries or varying run-in headings. (13:1) Aircraft from Moody also use the range at Eglin when it is available as well as the SETTA for overwater air-to-air training.

Like Hill, Moody was chosen to support the fighter mission as the Vietnam war drew down. As a basic pilot training base, it had no need for air-to-surface ranges or supersonic airspace. Fighters arriving at the base were forced to fend for themselves, taking training opportunities as they arose. Only with creation of the range has Moody really begun to develop a true fighter infrastructure.

Moody's capabilities lie, clearly, in the air-to-surface mission and the bases future missions should so reflect.

Mountain Home AFB, ID: Mt Home AFB is located ten miles southwest of the town of Mountain Home, Idaho and about 50 miles southeast of Boise. The base supports a single wing which contains both the long range air-to-surface F-111 and the electronic combat version of that aircraft, the EF-111. Mt Home also owns and controls an air-to-surface gunnery and electronic combat range at Saylor Creek, 22 miles away. (22)

The northernmost tactical fighter base in the lower 48 states, Mt Home experiences surprisingly good weather most of the year and loses few training days to low ceilings and visibility. Both the base and the range are located in a valley and the range is usually approachable under the clouds. There is subsonic training airspace available and, once a year, permission is obtained to fly supersonic in this area. There may even be potential to have this area approved for supersonic flight on a full time basis if the Air Force chooses to pursue that option.

The base itself is large and uncongested. There is ample room for expansion on base and added aircraft could easily be accommodated in existing training areas. Relationships between the base and the town of Mountain Home are excellent. Nevertheless, the town is quite small and many base personnel live in Boise. Any expansion would have to carefully address housing issues.

Future basing at Mt Home should continue to take

advantage of the range and electronic combat capabilities. Mt Home would be an excellent choice for a dual role fighter or a follow-on ground attack aircraft. It might also support the EC-130 Compass Call mission should it ever have cause to be moved from Davis-Monthan.

Myrtle Beach AFB, SC: Myrtle Beach AFB is located immediately west of the City of Myrtle Beach, South Carolina. The base hosts a single air-to-ground fighter wing and, additionally, is a joint civil/military field. Thus there is a civilian passenger terminal and commercial airliners share the single runway with military aircraft.

Myrtle Beach is located on a 60 mile strip of land referred to as the Grand Strand and well known as a resort area. (6:II-2,3) Being located on the Atlantic Ocean, the base has easy access to over water supersonic training areas (which its A-10 aircraft have no use for). Additionally, its units have access to several air-to-surface gunnery ranges including the small Air Force range at Poinsett, 78 miles away, and the larger facility at Dare County, 180 miles distant. (22)

As might be expected, Myrtle Beach has experienced some degree of urban encroachment although the AICUZ recommendations have been largely followed. The problem may emerge when an eventual replacement is selected for the current A-10 aircraft. The A-10 is one of the quietest Air Force jet aircraft and, thus, the AICUZ noise compatibility contours it generates are among the smallest. Current urban

development patterns, created in compliance with A-10 noise levels may not be compatible with a follow on jet fighter. Even though the base might seem best suited to an air-to-air follow on, environmental considerations may dictate otherwise. It might prove necessary to retain the A-10 at Myrtle Beach as long as possible and to choose a replacement primarily on its noise signature.

Nellis AFB, NV: Nellis AFB is located at the northern edge of the Las Vegas, Nevada metropolitan area. The base's identity is virtually inseparable from the large training areas and air-to-surface ranges to the north and west. It is in these areas that Red Flag, TAC's realistic combat scenario exercise, is held. Here also, students of the USAF Fighter Weapons Instructor School earn their equivalent of a Masters degree in fighter aircraft planning and employment. The base hosts the Tactical Fighter Weapons Center with an air-to-ground fighter wing, a Fighter Weapons Wing, and numerous ancillary organizations performing such functions as range maintenance and control, fighter tactics development and evaluation, and system test and evaluation. Nellis may also be playing host at any one time to as many as 100 deployed aircraft participating in one of the five annual Red Flag exercises. (10:78)

Encroachment is a fact of life, even in the Nevada desert. Protests over limiting of public access to the range have been well publicized and the controversy over the status of the land on which the range is located has been heated.

Efforts to expand the airspace associated with the range have also met with opposition. Moreover, urban development is squeezing in on the southern edge of the base and departing aircraft must execute sharp turns upon clearing the runway to avoid overflying populated areas. (7:III-5) The main base cantonment area, meanwhile, is nearly overflowing. A recent initiative to expand the parking apron would have required land acquisition.

Clearly, the Tactical Air Command faced an unhappy choice when they recently announced removal of the F-16 wing from Nellis. This will ease overcrowding, however, and allow the continuation of Red Flag on a realistic scale. The move also acknowledges the fact that the Nellis range has reached a point of saturation which has forced F-16 aircraft permanently based at Nellis to deploy elsewhere to complete air-to-surface training events. (20) This action was appropriate and demonstrates an awareness of basing issues. Nellis' future must be linked to its ranges and to the training and test & evaluation which can only be done so effectively there.

Seymour Johnson AFB, NC: Seymour Johnson AFB is located at the southern edge of Goldsboro, North Carolina. The base hosts an active duty air-to-ground fighter wing and an aerial refueling squadron which is transitioning to KC-10 aircraft.

Seymour Johnson is located approximately 90 miles from the Atlantic Coast and is within acceptable distance from

over water supersonic airspace. The base also manages the air-to-surface gunnery range at Dare County, just over 100 miles north of the base. (22) Aircraft assigned to the base have, at various times, been assigned both air-to-air and air-to-ground missions.

The base's 1983 Air Installation Compatible Use zone report sited potential encroachment problems, particularly to the east and northeast of the base. (8:IV-4) These problems included commercial development in the accident potential zone at the northeast end of the single runway. Currently, the base is assigned F-4 aircraft which are among the noisiest fighter aircraft in the active inventory. Eventual conversion to a newer aircraft would probably reduce the noise contours but would certainly not alter the accident potential zones. Assignment of any aircraft which might require a great deal of night activity could actually increase AICUZ noise contours, however, and accentuate the noise related problems. (The Environmental Protection Agency has directed that noise created during night hours be weighted more heavily in noise level computations than daytime noise due to the lower levels of background noise at night.)

Due to the relatively heavy density of population on the east coast at the time when air bases were first being developed, there is a real lack of good air-to-surface gunnery ranges there compared with the Desert Southwest. Dare County, while not ideal, is one of the better east coast

ranges and is used by the Marine Corps and Navy as well as the Air Force. Only three bases are within acceptable distances to use Dare County range: Seymour Johnson, Langley and Myrtle Beach. Langley has an air-to-air mission and is likely to retain it. Myrtle Beach is on the edge of acceptable flying distances and uses closer ranges when possible. It makes best sense from a resources prospective, therefore, to retain Seymour Johnson in air-to-ground fighters. To that end, the Air Force announced in January that Seymour Johnson would soon transition into the F-15E air-to-ground fighter. This may not prove to be a prudent choice, however. If the F-15E is required to perform a significant portion of its training at night, it could aggravate the noise and urban encroachment problems sited above.

Shaw AFB, SC: Shaw AFB is located eight miles west of Sumter, South Carolina. The base hosts an active duty numbered air force headquarters, an air-to-ground fighter wing, a tactical air control wing and a single squadron of reconnaissance aircraft. Additionally, Shaw owns and controls a small air-to-surface gunnery range eight miles north at Poinsett. (22)

The Poinsett Range is among the smallest in TAC and is not really adequate to F-16 training requirements. From the early 1950's until 1982, however, Shaw was primarily a reconnaissance base and Poinsett was adequate to the requirements of its primary users, the small, propeller

driven aircraft of the Tactical Air Control Wing. Two other ranges lie within a 200 mile radius of Shaw and are now used frequently by both wings. Shaw is not within economical range of suitable supersonic training areas.

As with most bases, Shaw has some problems with urban encroachment. The base is located within Sumter County and there are no zoning ordinances to protect land within AICUZ noise contours or clear zones from development. Nor do building codes require noise attenuating construction techniques for structures within the noise incompatibility areas. (9:IV-3&4) These violations are scattered, however, and do not pose a serious threat to aircraft operations.

Shaw is certainly better suited for continued air-to-ground missions than air-to-air. The base might be even better suited, however, to a return to reconnaissance should a new recce aircraft be developed.

Tyndall AFB, FL: Tyndall AFB is located 13 miles east of Panama City, Florida on spit of land which lies between St Andrew Bay and the Gulf of Mexico. The base supports an air-to-air training wing as well as the Air Force Air Defense Weapons Center and numerous non flying tenant organizations. The Weapons Center performs a number of missions including the training of ground radar weapon controllers, the air-to-air weapon system evaluation program (WSEP), Copper Flag and the biannual William Tell competition. Tyndall is, thus, heavily used by deployed as well as permanently assigned fighter aircraft.

Tyndall's location might suggest that the base is relatively immune from encroachment problems. This is not totally true. An ongoing city initiative to construct a general aviation airport under existing aircraft recovery patterns would introduce serious midair collision potential. Base personnel are attempting to work with local officials to avert this situation by resiting the general aviation facility outside Tyndall's traffic pattern. Further, the presence of US Highway 98 running through the center of the base complicates security and narrowly defines the flightline area.

Tyndall shares access to the southeast Test and Training Area for over water supersonic training with Eglin. It also has limited over land subsonic air-to-air maneuvering airspace which it controls. The Eglin Range is also close by for any air-to-surface training required. As previously noted, both the Eglin Range and the SETTA are heavily used for Test & Evaluation flying. Throwing in the requirements of nearly 150 F-15 aircraft stationed at Tyndall and Eglin plus Copper Flag and WSEP missions, the SETTA is saturated. Thus, while Tyndall might seem to invite expansion based strictly on base facilities, the training areas nearby would not support the added load.

Nor would the Eglin Range support addition of an air-to-ground mission at Tyndall without some rethinking of the existing Test & Evaluation mission priority system. The best use of the base is to continue supporting an air-to-air

mission, perhaps as the first Advanced Tactical Fighter training base, and to keep base aircraft assignments close to current levels.

Williams AFB, AZ: Williams AFB is located 14 miles southeast of Mesa, Arizona on the southeastern edge of the Phoenix metropolitan area. An Air Training Command (ATC) base, Williams hosts a undergraduate pilot training wing as well as a TAC squadron which is responsible for the training of foreign pilots in the F-5 aircraft manufactured in the United States for foreign military sales.

As with its neighbor, Luke, Williams enjoys access to the Luke Ranges as well as over land supersonic training areas and low altitude maneuver areas. Located to the east of Phoenix, however, Williams has not experienced anywhere near the degree of encroachment as its neighbor to the west. Smart zoning could still spare Williams from the problems besetting Luke.

Installation officials were quick to point out to the author during a November 1985 survey that ATC considers Williams its premier base, and with good reason! The weather is excellent, as is access to training areas. When weather problems back up pilot production at other pilot training bases, Williams can be counted on to pick up the "slack."

Williams, because of its access to the Luke Ranges, would also be an invaluable addition to the tactical basing structure should encroachment ever become so severe as to limit operations at either Luke or Davis-Monthan. Turning

Williams into a tactical base would not be well received by the training community. Without replacement, the Air Force's ability to produce pilots, especially in a wartime "surge" situation would be severely impacted. Nevertheless, it would prove easier to replace a pilot training base, which has no supersonic or air-to-surface range requirements, than to replace the vast range and airspace complex centering on the Phoenix area. Williams' most optimum future may well be as a tactical fighter base supporting one or more wings of air-to-ground tasked aircraft.

## CHAPTER VI

### POSSIBLE SOLUTIONS -- BASING AND NON BASING

When ever problems regarding training and air base suitabilities arise, two possible solutions will be usually be offered. The first of these is simulation. The second is the use of more distant areas to train, either by use of aerial refueling or by deploying the entire unit to another base. In fact, the Air Force is already pursuing both to some degree. In this chapter, I will examine how these two nonbasing solutions are being employed and the extent to which expanding their use may be practical in solving basing problems. I will also look briefly at two solutions which are more innovative in nature. The first would alter, to some degree, the way in which Test & Evaluation mission priorities are handled. The second suggests a method by which certain bases might be relocated at no expense to the Federal Government through land exchanges.

Simulators: The Air Force has been using simulation to train pilots since WW II. At that time, however, the simulator was nothing more that a procedural trainer which bore little resemblance to a real airplane. Even in the late 1960's, simulators were little more than instrument trainers. It is only recently that we have been able to simulate air-to-air combat and air-to-surface weapons deliveries with a reasonable degree of realism. Simulators are not inexpensive, however. A 1985 Air Force Human Resources

Laboratory report suggests that the cost of a multiple cockpit tactical flight simulator is likely to exceed \$100 million. (21:31)

There are several requirements, key to realistic simulation, which drive simulator costs so high. The first is the provision of a visual outside environment. Tactical flying is done with primary reliance on visual cues rather than instruments or ground mapping radar. Realistic visual scenes are imperative, therefore, to realistic tactical fighter simulator training. The second requirement is motion. Again, important cues in tactical flying are received through "the seat of the pants." Gravitational forces are primary among motion cues and are not readily simulated. The third requirement is the ability to simulate multiple aircraft. The tactical fighter is seldom alone in the sky. There are usually wingmen, adversaries, or both. For simulation to be realistic, therefore, the simulator must incorporate multiple cockpits. Each pilot must have his own cockpit with independent maneuvering capability and, additionally, each cockpit must be completely interfaced with the others. An Air Force Human Resources Laboratory study suggests that realistic tactical simulation requires at least four separate but interfaceable simulators. (21:22)

In fact, the Air Force Human Resources Laboratory continually assesses simulation capabilities for realism, cost and practicality. While their studies show greatly increased capabilities in visual depiction, air-to-air target

images were judged deficient by most pilots using the HRL facilities in a 1982 report. (14:i) Emerging technologies such as head/eye slaved displays (21:22) may help, but are probably still several years away. Motion systems have improved also, but, as previously noted, cannot adequately simulate the increased gravitational forces occurring in maneuvering flight.

There are several existing facilities which do offer state of the art simulation to train Air Force pilots. These include the Advanced Simulator for Pilot Training at Williams AFB, the Simulator for Air-to-Air Combat at Luke AFB, and the McDonnell-Douglas Aircraft simulation facility in St Louis. (21:18) These facilities are being used not only for pilot proficiency training but for evaluation of new systems and technologies as well.

As costs come down and realism increases, it will be inevitable that simulation will play an increasingly important role in flight training. Nevertheless, one should resist the temptation to try to make economic comparisons between simulation and flying hours. Even if the entire tactical air environment could be effectively simulated, simulators would probably be used to augment and not to replace actual flight training. In the author's opinion, the factor which will drive increased use of simulation will not be economics. Rather, it will be an inability to attain proficiency in certain types of missions in any other way. Examples of this might be the practice of in-the-weather

weapons deliveries at southwestern bases or night low level ingress tactics from highly urbanized southeastern installations.

Inflight Refueling: Inflight refueling can add significantly to the distance which a fighter aircraft can fly. It is theoretically possible for a fighter aircraft to take off from the East Coast, air refuel, fly an air-to-surface weapon delivery training mission on the Nellis Ranges and return to home station in a single mission. That is basically how the 15 April 1986 raid on Libya was carried out by United Kingdom based F-111's.

Theory and fact do not always go hand in hand, however. First, it must be noted that time spent in transit to and from working areas is essentially non productive. The farther training areas are from home base, therefore, the more flying time is non productive. Second, jet fuel is both expensive and limited in availability. Fuel which is not generating useful training is essentially wasted. Third, air refueling requires a dedicated aerial tanker. This tanker also uses jet fuel as well as aircrew time. It is true that tactical aircrews require semi-annual refueling practice. The requirement is only for three refuelings each six months, however. (26:6-43) Finally, implicit in the suggestion that training can be accomplished at distant ranges using air refueling is the availability of unused training time on those ranges. Most Air Force top quality ranges and supersonic training areas are fully used and those few with

some excess time could not support the entire requirement of several added wings of fighter aircraft.

The Air Force does use air refueling as a method of achieving training on distant ranges in some instances. Generally, this method is used in major force employment exercises such as Gallant Eagle or Bold Shield. Daily use of air refueling to reach distant training areas is, however, neither practical nor cost efficient.

Unit and aircraft deployments: There are two possible scenarios for deployment of aircraft to accomplish training. The first is deployment of single flights of aircraft for short periods, possibly one day or less. The second is the deployment of entire units of aircraft including support personnel for longer periods of time, usually a week or more. Both continue to be used in training of tactical aircrews and both are practical to a point.

An example of the first is Combat Echo, an ongoing exercise wherein tactical aircraft deploy to the Eglin/Tyndall area for several days for live fire training of air-to-air ordnance against drone targets. Similarly, F-4G aircraft may deploy to Nellis for a day to work with specific Red Flag scenarios. (20:35) In still another example, during the 1970's F-4 aircraft from Holloman used the Luke ranges, landed to refuel at Luke or Williams, then used the ranges a second time and returned to home station.

Deployment of units is even more widely used. Winter weather often precludes northern tier Air National Guard and

Air Force Reserve units from training in their local areas. The Guard and Reserve, therefore, participate regularly in a program called Snow Bird, deploying their whole unit to a southern tier tactical base for a week or more to use ranges, low level routes and airspace. Nor are the reserve forces the only ones affected by winter weather. For the past several years, the 388th Tactical Fighter Wing, based at Hill AFB just east of the Great Salt Lake has had to deploy one or more squadrons during the winter months to achieve requisite training. The expense of these deployments was the primary reason cited for removal of one of the wing's four squadrons.

Training exercises is another reason for deploying units. Best known of these exercises are Tactical Air Command's "Flag" series which include Red Flag at Nellis AFB, Copper Flag at Tyndall AFB, and Green Flag at Eglin AFB. In 1984 alone, over 7,100 aircrews participated in Red Flag, receiving realistic training in a wartime scenario. (20:15)

A third reason for unit deployments is to practice wartime tasking at a base similar to the one to which the unit is assigned in contingency operations. Checkered Flag and Crested Cap are two such exercises.

Deployed training is widely used, then, and can contribute significantly to a unit's combat readiness. The principle drawbacks are the cost of deployments and the availability of bases which can support such deployments, from the aspect of aircraft parking ramp, maintenance facilities, billeting, etc., as well as range and airspace

availability. Given increasing shortfalls in our tactical basing structure, the cost factor may seem less significant as time goes on.

The USAF Priority System: The USAF priority system is aimed at assigning mission priorities which resolve any conflict over availability of physical assets to include ranges and airspace. Priorities are set by the Director of Programs and Evaluation for the Air Force and published in the Program Document, Units and Priorities (PD). This document is published twice a year and assigns relative priorities not only by mission, but by program within each broad mission category. In practice, mission priority decides which of several potentially conflicting requests for resources (i.e. range time) will take precedence. In all cases, Test & Evaluation receives a higher priority than training. In general, this is as it should be. Test missions involve a great deal more planning than do training missions. Often an entire team of scientists and engineers are supporting a single test mission, and, frequently, special range and airspace configurations may be required to track, measure and evaluate tests. Training is a great deal more flexible, though not absolutely flexible by any means.

In theory, a given range is blocked for a test, then is released after the test is complete. In practice, however, this scheduling method is unnecessarily wasteful. Too often, ranges are blocked for hours or even days for the completion of a single test which may last under an hour in

total. The range sits vacant until the test is run and, although it may be released upon completion, fighter scheduling may not be flexible enough to be able to use the range time upon such short notification.

I am not arguing for any drastic change to the priority system. I am suggesting that range and airspace availability is too critical to the overall basing structure to underuse it. It would seem that the answer lies in scheduling and not in priority. It is not unreasonable to allow training aircraft access to test areas until a test mission is ready to be launched with the understanding that the training aircraft will exit immediately upon notification by the controlling agency. Subsequent flights could hold outside the test airspace until the test is completed or could be rerouted to an alternate area, albeit one with less capability. Such scheduling practices would maximize the use of airspace and ranges.

Land Exchanges: Many Air Force bases which face the worst encroachment problems are located on land which has increased dramatically in value since the bases were first constructed. As noted above, for example, land values around Luke AFB are as high as \$20,000 per acre. At stake, moreover, is not merely the value of the land on which the base is located but the value of land left undeveloped in clear zones, accident potential zones and under the louder noise contours of the AICUZ. For the state, the quandary is that, on the one hand, the base contributes significantly to

the local economy. In the case of Luke, this figure is estimated at nearly \$250 million per year. On the other hand, state and county revenues are usually largely based on property taxes so undeveloped and federally held lands actually represent a revenue loss.

On a case by case basis, it might be possible for individual state governments to construct completely new facilities at a location suitable both to the state and the Air Force but away from current urban encroachment areas. On the completion of these new facilities, a land exchange would be made. The state benefits from such an exchange since it would now own the current base and be free to use it as they see fit -- most probably selling parcels to developers. The Air Force benefits in that constraints imposed by current encroachment could be lifted. If handled properly, the exchange agreement could include provisions for the state to hold as a future buffer, land in critical areas of the AICUZ for the new base. This might help ensure that the factors which led to the current serious encroachment are not repeated.

This approach is not without pitfalls. First, it must be accomplished by the state and not the Federal government. The Federal government, realistically, cannot provide the up front funding required due to annual budget restrictions, even though there are programs in existence which might in theory be used. Moreover, the Federal government cannot legally buy or hold land in excess to its requirements. This

precludes obtaining land designed as a buffer. Further, by making the new base a state project, the Air Force is spared responsibility for the environmental documentation. Most important, though, is that the consequences of the new siting decision, potentially unpopular due to the NIMBY (Not In My Back Yard) syndrome, must be resolved by the state government and not the Air Force.

The second potential pitfall is that moving an Air Force operation away from an area of encroachment may set an unwanted precedent. The signal may be that the defense mission is somehow less important than urban development. States which wanted a base relocated but were unwilling or unable to fund the replacement might successfully use this precedent against us in a Congressional forum. Third, in cases where the state and the Air Force may disagree as to the suitability of a new site, the future of our basing structure might be left open to some form of legal arbitration, most likely within the Congress. This could leave the Air Force in an unfavorable position. There may be other draw backs to this or any innovative approach to solutions for the Air Force's tactical basing problems. The possibility of draw backs doesn't mean that innovative solutions should not be sought, or even tried.

## CHAPTER VII

### REALIGNMENTS AND BASE CLOSURES

An unpublished briefing prepared under the direction of the Air Force Deputy Chief of Staff for Programs and Resources reports that there are 94 major Air Force installations in the CONUS and Alaska. (27) To Congress and to our critics that sounds like too many. The Air Force has been under increasing pressure in recent years to close one or more of those installations, thus saving money. Until recently, the Air Force has attempted to resist this closure pressure -- and with good reason.

Base Operating Support (BOS) is the cost of opening the gate of an Air Force Base. It includes such items as building maintenance, security, utilities and pay for personnel not directly mission related. While BOS costs do increase marginally with an increase in mission -- aircraft assigned for example -- the largest portion of BOS costs are fixed. In closing a base, therefore, the Air Force can, in theory, save the fixed BOS costs of operating that base.

When the operational mission of a given base can be terminated, the above theory holds pretty much true. When we have to relocate missions, the theory begins to break down. Relocation is expensive. Not only must personnel and equipment be moved, but facilities must be constructed at the receiving bases and civilian employees at the inactivating base given severance pay. Moreover, there is a loss of

mission readiness associated with any relocation effort which must be expected to last from six to nine months. It is the author's experience in conducting many of these studies that payback times may range from three to seven years, depending on actual cost accrual and savings generated.

Relocation of missions is, in itself, a difficult task. Air Force assets are tasked under war plans as units. These units must be based together and train together to be an effective fighting force. Normally, the minimum unit is the squadron, consisting of 24 aircraft and from 650 to 750 operational and maintenance personnel. (23) In relocating a squadron, several factors must be considered including the physical capability of the new base to support additional aircraft and personnel (adequate housing, flightline space, etc.), the capability of nearby training areas to support additional aircraft (Tyndall, for example, is physically able but training area constrained) and the infrastructure in place at the new host base (an airlift wing, for example, could not provide appropriate wing supervision to a fighter squadron).

From the Air Force's standpoint, there is an even more serious problem associated with base closures. That problem is the loss of access to gunnery ranges, low level navigation routes, supersonic airspace and other training areas. Most of these training assets are irreplaceable. The cost associated with the purchase of thousands or even millions of acres of land (the Luke Range, for example, is made up of 2.7 million acres) is prohibitive. The process of preparing an

environmental impact statement, clearing and preparing the land and constructing the range would take years, if it could be done at all.

All this should not be interpreted as intransigence on the part of the Air Force. Indeed, the Air Force has closed 79 major CONUS installations since 1960. (27) These were closed, however, in response to mission drawdowns and not strictly as money saving measures. As pilot production requirements have decreased, for instance, three undergraduate pilot training bases were closed and another given over to TAC. Reductions in the air defense interceptor mission brought similar closures along the northern tier of the U.S. (11)

Thus, base closures and mission realignments do have a valid place in base structure considerations. In fact, the Air Force has been quite responsible in managing its basing structure over the years. Closures accomplished strictly as a near term cost saving method, however, do not work. Moreover, they tend to adversely impact on readiness, to create overcrowding on remaining bases and more competition for training resources, and to reduce the flexibility to respond to contingencies such as force growth, return of forces from overseas and changing threat. (27)

## CHAPTER VIII

### SUMMARY AND CONCLUSIONS

When the Air Force's tactical basing structure was created, air bases were generally built miles from existing centers of population. Over the years, urban growth has relentlessly stalked many of those installations and it is no longer unusual to find development at the very fences of our bases. At the same time, technological advancements in tactical fighter design have resulted in afterburning jet engines and faster flying speeds in all regimes of flight. Noise of operations has increased even as environmental awareness has grown among members of the general public. General and civil aviation has expanded, creating more competition for the skies. Supersonic training annoys people living under our operating areas and has created ill will. Competition for land from both the public and private sectors threatens ranges and bases alike.

The tactical world is especially hard hit by all this. Tactical fighters do not usually carry enough fuel to reach distant training areas and are largely dependant on ranges and airspace within 200 miles of home. Tactical training must be realistic to be effective, and tactics required to defeat increasingly sophisticated threat systems are more and more dependant on speed and low altitude maneuvering. The dichotomy seems almost insoluble.

The problem is recognized, nevertheless, and some

actions have been taken to at least forestall confrontation. The AICUZ program, quiet hours and traffic pattern alterations have all been undertaken to attempt to be considerate neighbors and to save our bases. Increasing use of simulators and deploying aircraft -- and even entire units -- to more remote training areas are helping and may play an even larger role in the future

The key to retaining the tactical basing structure which is needed to sustain our forces, however, is the careful matching of missions with bases. We must recognize the limitations of even some of our best installations and be willing to live within those limitations. As follow-on fighters come into the inventory, it will not be enough to make basing decisions on intuition. Careful study of the entire tactical base structure and master planning will be necessary. In some cases, innovative thinking may be required, as in the possible revamping of procedures used in range mission prioritization. Only through planning today can the tactical fighter force's basing needs of tomorrow be met.

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